

WHAT IS CLAIMED IS:

- 1 1. A process for the preparation of a dialkyl peroxide comprising reacting one or more members selected from the group consisting of an alkylating alcohol of the formula ROH, and an olefin of the formula $(R^2)(R^{2a})C=C(R^3)(R^{3a})$, wherein R is C₁-C₁₀ alkyl, and R², R^{2a}, R³, and R^{3a} are independently selected from hydrogen and C₁-C₁₀ alkyl; with a hydroperoxide of the formula R¹OOH, wherein R¹ is C₁-C₁₀ alkyl; in the presence of an effective amount of a substantially solid, insoluble, heterogenous acidic catalyst; followed by separation of the reaction mixture from said catalyst.
- 1 2. A process according to Claim 1 for the preparation of di-*tert*-butyl peroxide comprising reacting one or more members selected from the group consisting of *tert*-butyl alcohol and *iso*-butylene; with *tert*-butyl hydroperoxide; in the presence of an effective amount of a substantially solid, insoluble, heterogenous acid catalyst.
- 1 3. A process according to Claim 1 for the preparation of di-*tert*-amyl peroxide comprising reacting one or more members selected from the group consisting of *tert*-amyl alcohol and *tert*-amylene; with *tert*-amyl hydroperoxide; in the presence of an effective amount of a substantially solid, insoluble, heterogenous acid catalyst.
- 6 4. A process according to Claim 1 wherein said substantially solid, insoluble, heterogenous acid catalyst comprises an at least 10% cross-linked ion exchange resin catalyst.

- 1 5. A process according to Claim 2 wherein said substantially solid,
2 insoluble, heterogenous acid catalyst comprises an at least 10% cross-linked
3 ion exchange resin catalyst.

- 1 6. A process according to Claim 3 wherein said substantially solid,
2 insoluble, heterogenous acid catalyst comprises an at least 10% cross-linked
3 ion exchange resin catalyst.

- 1 7. A process according to Claim 1 wherein said substantially solid,
2 insoluble, heterogenous acid catalyst is an at least 20% cross-linked
3 polystyrene-divinyl benzene acidic resin catalyst.

- 1 8. A process for the preparation of a dialkyl peroxide comprising
2 reacting one or more members selected from the group consisting of olefins
3 of the formula $(R^2)(R^{2a})C=C(R^3)(R^{3a})$, wherein R^2 , R^{2a} , R^3 , and R^{3a} are
4 independently selected from hydrogen and C_1-C_{10} alkyl; with a
5 hydroperoxide of the formula R^1OOH , wherein R^1 is C_1-C_{10} alkyl; in the
6 presence of an effective amount of a substantially solid, insoluble,
7 heterogenous acidic catalyst; followed by separation of the reaction mixture
8 from said catalyst.

- 1 9. A process according to Claim 8 for the preparation of di-*tert*-butyl
2 peroxide comprising reacting *iso*-butylene with *tert*-butyl hydroperoxide in
3 the presence of an effective amount of an acidic ion exchange resin catalyst.

- 1 10. A process according to Claim 8 for the preparation of di-*tert*-amyl
2 peroxide comprising reacting *tert*-amylene with *tert*-amyl hydroperoxide in
3 the presence of an effective amount of an acidic ion exchange resin catalyst.

- 1 11. A process for the preparation of a dialkyl peroxide which comprises
2 reacting a reactant selected from the group consisting of an alcohol having
3 the formula ROH, an olefin having the formula:



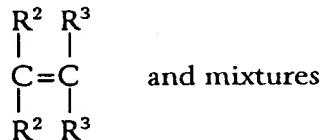
- 9 with an organic hydroperoxide having the formula R^1OOH in the presence
10 of an effective amount of an acidic, at least 10% cross linked, ion exchange
11 resin catalyst, R and R^1 being alkyl groups having to 10 carbon atoms, and
12 R^2 and R^3 being hydrogen or R.

- 1 12. A process for the preparation of ditertiary butyl peroxide which
2 comprises reacting a reactant selected from the group consisting of tertiary
3 butyl alcohol, isobutylene, and mixtures with tertiary butyl hydroperoxide
4 in the presence of an effective amount of an acidic, at least 10% cross-linked
5 ion exchange resin catalyst.

- 1 13. A process for the preparation of tertiary amyl peroxide which
2 comprises reacting a reactant selected from the group consisting of tertiary
3 amyl alcohol, tertiary amylene, and mixtures with tertiary amyl
4 hydroperoxide in the presence of an effective amount of an acidic, at least
5 10% cross-linked ion exchange resin catalyst.

1 14. The process of claim 11 wherein the said resin is at least 20% cross-
2 linked polystyrene-divinyl benzene acidic resin.

1 15. A process for the preparation of a dialkyl peroxide which comprises
2 reacting an olefin having the formula:



8 with an organic hydroperoxide having the formula R^1OOH in the presence
9 of an effective amount of an acidic ion exchange resin catalyst, R^2 and R^3
10 being hydrogen or R , R and R^1 being alkyl groups having to 10 carbon
11 atoms.

1 16. A process for the preparation of ditertiary butyl peroxide which
2 comprises reacting isobutylene with tertiary butyl hydroperoxide in the
3 presence of an effective amount of an acidic ion exchange resin catalyst.

1 17. A process for the preparation of ditertiary amyl peroxide which
2 comprises reacting tertiary amylene with tertiary amyl hydroperoxide in the
3 presence of an effective amount of an acidic ion exchange resin catalyst.